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1 Progress in Picture Processing: 1969--71

Azriel Rosenfeld

June 1973 **ACM Computing Surveys (CSUR)**, Volume 5 Issue 2

Full text available: pdf(2.34 MB)

Additional Information: full citation, references, citing, index terms**2 Session P13: tensor visualization: Tensor field visualisation using adaptive filtering of noise fields combined with glyph rendering**

Andreas Sigfridsson, Tino Ebbers, Einar Heiberg, Lars Wigström

October 2002 **Proceedings of the conference on Visualization '02**

Full text available: pdf(4.56 MB)

Additional Information: full citation, abstract, references, index terms

While many methods exist for visualising scalar and vector data, visualisation of tensor data is still troublesome. We present a method for visualising second order tensors in three dimensions using a hybrid between direct volume rendering and glyph rendering. An overview scalar field is created by using three-dimensional adaptive filtering of a scalar field containing noise. The filtering process is controlled by the tensor field to be visualised, creating patterns that characterise the tensor f ...

Keywords: glyph rendering, hybrid rendering, strain-rate, tensor, visualisation, volume rendering

3 Picture Processing by Computer

Azriel Rosenfeld

September 1969 **ACM Computing Surveys (CSUR)**, Volume 1 Issue 3

Full text available: pdf(2.69 MB)

Additional Information: full citation, references, citing, index terms**4 Hardware-accelerated texture advection for unsteady flow visualization**

Bruno Jobard, Gordon Erlebacher, M. Yousuff Hussaini

October 2000 **Proceedings of the conference on Visualization '00**

Full text available: pdf(760.42 KB)

Additional Information: full citation, citing, index terms

Keywords: OpenGL, advection, hardware, pathlines, streakline, texture, unsteady, vector field

5 Anisotropic diffusion of surfaces and functions on surfaces

Chandrajit L. Bajaj, Guoliang Xu

January 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 1

Full text available:  pdf(6.17 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a unified anisotropic geometric diffusion PDE model for smoothing (fairing) out noise both in triangulated two-manifold surface meshes in IR^3 and functions defined on these surface meshes, while enhancing curve features on both by careful choice of an anisotropic diffusion tensor. We combine the C^1 limit representation of Loop's subdivision for triangular surface meshes and vector functions on the surface mesh with the established diffusion model to ...

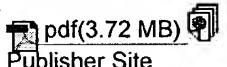
Keywords: Loop's subdivision, Riemannian manifold, Surface function diffusion, noise reduction, texture mapping

6 Session P3: filtering and sampling: A simple algorithm for surface denoising

Jianbo Peng, Vasily Strela, Denis Zorin

October 2001 **Proceedings of the conference on Visualization '01**

Full text available:



Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a simple denoising technique for geometric data represented as a semiregular mesh, based on locally adaptive Wiener filtering. The degree of denoising is controlled by a single parameter (an estimate of the relative noise level) and the time required for denoising is independent of the magnitude of the estimate. The performance of the algorithm is sufficiently fast to allow interactive local denoising.

Keywords: denoising, gaussian scale mixture model, meshes, multiresolution surfaces

7 Mathematical Models for Automatic Line Detection

Arnold K. Griffith

January 1973 **Journal of the ACM (JACM)**, Volume 20 Issue 1

Full text available:  pdf(1.24 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A particular decision-theoretic approach to the problem of detecting straight edges and lines in pictures is discussed. A model is proposed of the appearance of scenes consisting of prismatic solids, taking into account blurring, noise, and smooth variations in intensity over faces. A suboptimal statistical decision procedure is developed for the identification of a line within a narrow band in the field of view, given an array of intensity values from within the band. The performance of the ...

8 A survey of image registration techniques

Lisa Gottesfeld Brown

December 1992 **ACM Computing Surveys (CSUR)**, Volume 24 Issue 4

Full text available:  pdf(5.20 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Registration is a fundamental task in image processing used to match two or more pictures taken, for example, at different times, from different sensors, or from different viewpoints. Virtually all large systems which evaluate images require the registration of images, or a closely related operation, as an intermediate step. Specific examples of systems where image registration is a significant component include matching a target with a real-time image of a scene for target recognition, mon ...

Keywords: image registration, image warping, rectification, template matching

9 Session G: Image-based methods: Psychophysically based artistic techniques for increased perceived realism of virtual environments

Peter Longhurst, Patrick Ledda, Alan Chalmers

February 2003 **Proceedings of the 2nd international conference on Computer graphics, virtual Reality, visualisation and interaction in Africa**

Full text available:  pdf(9.28 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The perceived realism of a computer generated image depends on the accuracy of the modeling and illumination calculations, the limitations of the display device, and the way in which the Human Visual System processes this information. A real environment is unlikely to be pristine but will have accumulated dirt, dust and scratches from everyday use.

Although human observers do not perhaps consciously take note of these phenomena, the absence of such features from the synthetic representation of t ...

Keywords: human visual perception, image quality, realistic rendering, virtual reality

10 Applications of computer graphics to the visualization of meteorological data

T. V. Papathomas, J. A. Schiavone, B. Julesz

June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques**, Volume 22 Issue 4

Full text available:  pdf(3.39 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The need to visualize huge amounts of numerical data is exemplified in the field of meteorology, where measurements of many atmospheric parameters are routinely taken over large geographical areas for the purpose of monitoring and predicting weather. Computer graphics has provided and will continue to offer powerful tools to meet this visualization challenge, principally in three areas: first, efficient graphics algorithms for displaying the data; second, novel special-purpose graphics hardware; ...

Keywords: animation, atmospheric phenomena, clouds, display techniques, fog, image processing, interactive workstations, modelling, motion, perception, stereo, weather forecasting

11 A text image enhancement system based on segmentation and classification methods

Yaguang Yang, Kristen Summers, Mark Turner

November 2004 **Proceedings of the 1st ACM workshop on Hardcopy document processing**

Full text available:  pdf(4.39 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes document processing techniques used in ImageRefiner, the automatic image enhancement system developed by CACI International Inc. Though other methods are used in the system, we discuss two techniques that are novel and well tested or particularly important in the system. The first is a novel segmentation method that segments the text image file into "homogeneous" segments. The second is the use of a neural network to select the best transformation for each segment. Our ex ...

Keywords: OCR, image processing, neural network, segmentation

12 Novelty and topic change: Domain-independent text segmentation using anisotropic diffusion and dynamic programming

Xiang Ji, Hongyuan Zha

July 2003 **Proceedings of the 26th annual international ACM SIGIR conference on Research and development in information retrieval**

Full text available: [pdf\(171.61 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents a novel domain-independent text segmentation method, which identifies the boundaries of topic changes in long text documents and/or text streams. The method consists of three components: As a preprocessing step, we eliminate the *document-dependent* stop words as well as the generic stop words before the sentence similarity is computed. This step assists in the discrimination of the sentence semantic information. Then the cohesion information of sentences in a document o ...

Keywords: anisotropic diffusion, document-dependent stop words, dynamic programming, text segmentation

13 Image inpainting

Marcelo Bertalmio, Guillermo Sapiro, Vincent Caselles, Coloma Ballester

July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available: [pdf\(1.80 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Inpainting, the technique of modifying an image in an undetectable form, is as ancient as art itself. The goals and applications of inpainting are numerous, from the restoration of damaged paintings and photographs to the removal/replacement of selected objects. In this paper, we introduce a novel algorithm for digital inpainting of still images that attempts to replicate the basic techniques used by professional restorators. After the user selects the regions to be restored, the algorithm ...

Keywords: anisotropic diffusion, image restoration, inpainting, isophotes

14 Special issue on SAC 2001 best papers: Evolutionary image enhancement with user behavior modeling

Cristian Munteanu, Agostinho Rosa

April 2001 **ACM SIGAPP Applied Computing Review**, Volume 9 Issue 1

Full text available: [pdf\(831.87 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper we present a novel method for image enhancement of gray-scale images based on the simulation of evolution. Our method employs Genetic Algorithms to evolve the shape of the contrast curve in the image, while attempting to partially automate the subjective process of image evaluation (e.g. user behavior) by performing multiple regression on fitness values. Results obtained show the robustness and efficiency of the evolutive method for image enhancement. For several images in the test ...

Keywords: image enhancement, multiple regression, real-coded genetic algorithms, subjective fitness

Evolutionary image enhancement with user behaviour modeling

Cristian Munteanu, Agostinho Rosa

March 2001 **Proceedings of the 2001 ACM symposium on Applied computing**

Full text available: [!\[\]\(950a62bbddad88d64435fd35607dfc42_img.jpg\) pdf\(188.50 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

Keywords: image enhancement, multiple regression, real-coded genetic algorithms, subjective fitness

16 A model-directed image understanding system for computer vision

Huasheng Chen, Ke Chen

June 1990 **Proceedings of the third international conference on Industrial and engineering applications of artificial intelligence and expert systems - Volume 1**

Full text available: [!\[\]\(d5d7044e5caf6907399af2dced8d6ff8_img.jpg\) pdf\(484.72 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

An important research topic in AI is the discovery of constraints. As constraints. In this paper, we present a model-directed image understanding prototype to support computer vision, which can recover constraints of an image by means of the spatial relation and spatial reasoning. according to a model. In the prototype, an object is viewed as an arrangement of two types components, viz., crucial component and ordinary component. Under the direction of models, these components are looked for ...

17 Teaching applied computing without programming: a case-based introductory course for general education

Joe Marks, William Freeman, Henry Leitner

February 2001 **ACM SIGCSE Bulletin , Proceedings of the thirty-second SIGCSE technical symposium on Computer Science Education**, Volume 33 Issue 1

Full text available: [!\[\]\(b538fe54c1f3a7343e37e85cc2d00497_img.jpg\) pdf\(575.87 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We introduce general-education students to key ideas in applied computing through case studies from computer graphics, computer animation, image processing, computer vision, information retrieval, and artificial intelligence. Each case study consists of two lectures: one an intuitive exposition of relevant computer-science concepts, and the other a hands-on introduction to a working system that embodies these concepts. Students use these systems to perform design and problem-solving tasks, there ...

18 Multiresolution signal processing for meshes

Igor Guskov, Wim Sweldens, Peter Schröder

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**

Full text available: [!\[\]\(111c5272ee3f91361f0d2e3665dd6ad0_img.jpg\) pdf\(10.67 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: Laplacian pyramid, irregular connectivity, meshes, multiresolution, subdivision, surface parameterization, wavelets

19 An interdisciplinary course in digital image processing

Michael Magee, Sue Englert

March 1992 **ACM SIGCSE Bulletin , Proceedings of the twenty-third SIGCSE technical symposium on Computer science education**, Volume 24 Issue 1

Full text available:  pdf(505.33 KB) Additional Information: [full citation](#), [abstract](#), [index terms](#)

This paper documents the development and first offering of an interdisciplinary undergraduate course in Digital Image Processing at the University of Wyoming. The course itself was designed to serve majors from a wide range of academic disciplines, although in its initial offering, it was attended mainly by students majoring in Computer Science and Electrical Engineering. National Foundation funding for equipment for the course was used to purchase a high speed image processing system and s ...

20 A digital video information storage and retrieval system

Allan J. Myers

July 1976 **ACM SIGGRAPH Computer Graphics , Proceedings of the 3rd annual conference on Computer graphics and interactive techniques**, Volume 10 Issue 2

Full text available:  pdf(85.97 KB) Additional Information: [full citation](#), [abstract](#), [citations](#)

A concept of general purpose systems which generate, store, retrieve, process and display raster-scan format images is developed. The general purpose nature of such systems allows the handling of static and dynamic images from multiple sources as well as system synthesized images while precluding the use of special function hardware. A particular system implementation is described. The implementation was accomplished with standard digital computer and video hardware with the exception of one spec ...

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